EMBRYOLOGY.[1]

Growth of the Ovum in the Fowl.[2]—Prof. M. Holl, of Gratz, has made a detailed study of the formation of the membranes, acquisition of the yolk and change in the character of the nucleus of the hen's egg, while in the ovary.

In the chick just hatched the ova form "nests" or clusters of naked cells, each about 14 μ thick, beneath the germinal epithelium and surrounded by the connective tissue stroma of the ovary. Each ovum, when about 20 μ thick becomes enveloped by a delicate *tunica adventitia* that is really formed by some of the stroma cells flattening themselves out around the ovum; it is thus a product of the stroma, not of the ovum, though it is usually called the "vitelline" membrane.

Later the "follicular epithelium," so called, is formed around the ovum by the arrangement of spindle shaped stroma cells in a single layer about the ovum. The author would call this second stroma membrane the *granulosa.*

These epithelioid cells increase so that the follicle is made up of several layers. External to it a thin *membrana propria* is formed by a few flat stroma cells. Finally the stroma itself is arranged in a system of concentric fibres and cells, external to the three membranes it has formed. The ovum and its fellow epithelial cells are thus excluded from any part in the formation of the egg membranes.

The large central nucleus of the ovum is at first central, but makes two successive migrations towards the surface of the cell, becoming flattened on one side and applying this side close against the *tunica adventitia,* when it takes up its permanent position in the ripe egg. Irregularities in its contour are regarded, not as pseudopodia, but as artificial products. The nuclear net-work of chromatin has at first a fine mesh, but undergoes complex changes leading to its breaking up into minute granules, which are distributed throughout the nuclear substance.

The body of the ovum at first presents a wide-meshed system of non-staining material: this is then replaced by a fine-meshed system of staining material radiating out from staining centers, the *dotterkern,* next the nucleus. This mesh-work becomes finer and finer and its

[1]This department is edited by Dr. E. A. Andrews, Johns Hopkins University.

[2]Prof. M. Holl: Sitzb. Akad. Wiss. Wien, 1890, pp. 311–369, pl. I.

interstices occupied by very minute granules, which are the starting point for the formation of the yolk spherules.

These yolk spherules form first near the nucleus and then towards the periphery of the egg. In this way is formed what appears to be the white yolk at the center of the ripe egg.

The remaining mass of yolk is made gradually by the conversion of successive layers of granules into yolk spherules. These layers are formed outside the central mass and close to the *tunica adventitia*, the last formed being the outermost. Some of these layers become converted into yellow yolk.

The peripheral granular layer of the egg grows and is nourished by the aid of the *zona radiata*. This peculiar layer is formed, now, between the *tunica adventitia* and the granular outermost part of the egg and remains as long as yolk formation continues. Though apparently a part of the ovum, this layer is, the author holds, in reality a system of parallel radiating fibrils which are merely processes of the follicle cells! These processes pass through holes in the *tunica adventitia* and at the other end become continuous with the mesh-work of the peripheral part of the ovum.

The follicle (stroma) cells and the ovum are thus united by intercellular processes, by which nutrient liquids may pass into the ovum.

When the egg finally escapes from the ovary some fibrillar remnants of this *zona radiata* remain adherent to the inner side of the *tunica adventitia* and thus cause the somewhat double nature of the "vitelline" membrane.

No observations were made upon the proper maturation of the ovum, though certain peculiar bodies in the nucleus are regarded as preparations for the formation of the polar cells.

Sexual Glands in Mammals and in the Fowl.[1]—Dr. J. Janosik, from sections of embryos of the fowl, the sheep, the hog and man, has arrived at the following interesting conception of the nature of the genital glands, in reference to sex.

A proliferation of cells of the germinal epithelium gives rise to strings of cells which are to be later developed in the male (testis) but which in the female (ovary) are not developed. A second proliferation of the epithelium gives rise to the nests of cells to form the ova of the ovary.

The gland, ovary or testis, thus has a central, older, part that may become the male portion, and a peripheral, younger part that may

[1]Janošik; Sitzb. Akad. Wiss. Wien, 1890, pp. 260–288, pl. I.

become the female portion. If both derivatives of the germinal epithelium were to develop, both the first central, and the second, peripheral, there would result an hermaphrodite gland.

The epithelial cells that form the sperms in the male would be thus somewhat older, ontogenetically, than the epithelial cells that form the ova in the female.

The Tail in the Human Embryo.—Dr. Franz Keibel[1] having sectioned and reconstructed several human embryos of different ages endeavors to decide the difficult question as to the value of the posterior end of the trunk, as to the existence and magnitude of what may be truly called the tail.

In spite of the various criteria used by His in determining what is to be regarded as the caudal region, such secondary changes as the movements of the pelvis made known by Rosenberg make the problem much more difficult than might at first appear. The author counting back from the head reckons those mesoblastic somites or vertebræ as caudal which would be posterior to the sacrum of the adult.

From the present material and the observations of His and Fol it seems that embryos of 4 to 6 mm. have a true projecting tail with chorda, mesoblastic somites, medullary tube and also a caudal intestines or post-anal gut. Later the number of caudal segments may be as many as six while the intestinal tube closes first at the base then towards the tip of the tail.

This caudal appendage is thus more perfectly developed in the embryo than in the adult: a fact which the author would add to the various facts of human and comparative anatomy, which he enumerates as evidence of the former existence of a complete tail in the ancestors of man.

Embryonic Veins in the Limbs of Amniota.—Dr. F. Hochstetter[2] finds in the limbs of the rabbit, chick and the lizard a remarkable similarity in the earliest condition of the venous supply. Moreover the anterior and the posterior limbs are at first identical in this respect.

In such an embryonic limb, before the digits are apparent, there is an axial vessel serving as an artery and sending blood by radiating branches towards the single vein, which borders the pad-like foot. This border vein continues up the limb, on both anterior and posterior

[1]Archiv. f. Anat. Phys., 1891, pp. 356–388, plates 19–20.

[2]Morph. Jahrbuch, 17, 1891, pp. 1–42, plates 1–3.

sides, to connect with certain vessels in the trunk. Thus each limb contains a venous loop forming a border along the free tip of the limb, the foot.

As the digits form, the border vein becomes interrupted, but radial vessels remain between the digits. Various changes take place in the limbs of the venous loop, one limb soon disappearing so that but one of the original two connections between foot and trunk remains.

Later changes become too complex to be easily expressed in small compass and may be here passed over. Most of the work was done upon living specimens, so that the direction of blood-flow and certain interesting changes from artery to vein function could be observed.

In the Anamnia the author found in a Triton that though there is no border vein yet there is a vascular loop for each limb and later, when the digits appear successively, there is a duplication of this loop for each digit, producing a resulting arrangement not utterly different from the later stages of the border vein in the Amniota.

Endothelium and Blood Corpuscles in the Amphibia.[1]—Dr. Shwink has made a detailed study of the formation of the endothelial lining of the heart and chief vessels and of the origin of the blood corpuscles in the Anura *Bufo vulgaris* and *Rana fusca* as well as in the urodeles *Triton alpestris* and *Salamandra atra*. In these amphibians the author finds evidence that the cells forming the blood vessels arise, in part at least, in the entoblast and not in the mesoblast. Though he cannot exclude the mesoblast entirely, yet he fails to find evidence that it has any part to play in forming the endothelium, and regards the yolk-entoblast as forming most, if not all, of the endothelium cells.

The blood corpuscles arise later than the endothelial cells. They are made in three blood-islands posterior to the heart into which they are then carried by the movement of the serum. The nuclei of the corpuscles do not come from yolk spherules but from pre-existing nuclei which divide actively in the first formed corpuscles.

In the Anura the blood corpuscles are not formed from the mesoblast but from the yolk-entoblast. Yet this may be a recent departure from a phylogenetically older formation of blood cells from some mesoblast that is now incorporated in the entoblast. In the urodeles the evidence is conflicting and at present the author is unable to to decide whether the blood-islands are of mesoblastic or of entoblastic origin or in part of both.

[1]Morph. Jahrb., 7, 1891, pp. 288–331, plates 17–19.